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(71) Applicant: AGIP S.p.A.
Via Borgonuovo, 18
I-20121 Milano (IT)

(72) Inventor: Cerruti, Sergio Emanuele
Via Europa, 20
I-20097 San Donato Milanese, Milano (IT)

(74) Representative: Fusina, Gerolamo et al
Ing. Barzanò & Zanardo Milano S.p.A.,
Via Borgonuovo, 10
I-20121 Milano (IT)

(54) Quick-joint for rapid, tight-seal connection of pipes, particularly suitable for petroleum pipes.

(57) Quick joint for rapid, tight-seal connection of pipes, in which from the end (4''') of the female hollow body (4) an internal flaring (4'') with decreasing cross-section extends, suitable for getting engaged, with interference, with a corresponding external counter-flaring (1'') provided on the male hollow body (1) in the nearby of the overhanging shoulder (3) of the latter which, on its one side, cooperates with the sleeve (8) of the joint and, on its other side, cooperates with said end (4''') of said female hollow body (4); from the end (1''') of said male hollow body (4) furthermore a second external flaring (9,11) with decreasing cross-section extends, suitable for getting engaged, with interference, with a counter-flaring (10,12) provided inside the interior of said female hollow body (4) in the nearby of an internal shoulder (6) for said male body (1).

Also preferred embodiments are disclosed.

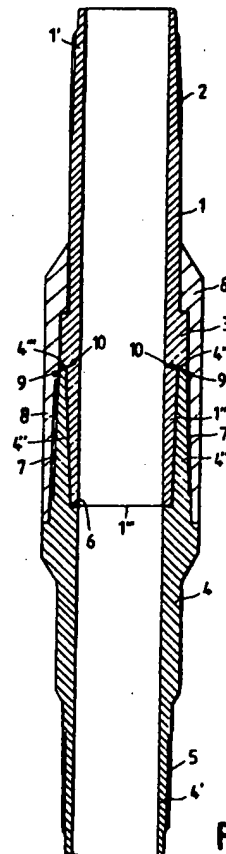


Fig.1

The present invention relates to a joint which, by realizing two metal seals with interference engagement activated by a screwable sleeve, makes it possible an easy, effective and cheap rapid, tight-seal connection of two pipes with each other to be accomplished with no need for said two pipes to be submitted to a revolutionary movement.

As known, in petroleum field and in particular in the operations for well completion, the need exists for connecting the production tubing with the so said tubing hanger at the wellhead. In the case of a single completion, said connection is made by simply screwing the single tubing onto the tubing hanger, a solution which is anyway impossible in the case of multiple completions, i.e., in the presence of two or more tubings to be connected, but using the expensive and complex through-adapter tubing hangers.

In order to obviate the above drawback, joints have been developed which make it possible the tubings to be connected with said tubing hanger, with no need for said tubings to be submitted to a revolutionary movement.

The joints known from the prior art substantially comprise a female hollow body to be butt-fastened to a tubing section, a male hollow body cooperating with said female body and to be fastened onto said tubing hanger, a first sleeve suitable for being screwed onto said male body in order to cause the elastomeric-elements seal provided between said bodies to become operating, as well as a second sleeve suitable for being screwed down onto said female body in order to ensure the mechanical continuity.

Unfortunately, such a kind of joint, besides a certain mechanical complexity, requires the use of two sleeves; and it does not ensure, with its elastomeric elements, an effective tightness of the sealing over time, in particular under such hostile operating conditions as generally met in petroleum field.

In order to accomplish a better seal tightness, in certain joints known from the prior art, a gasket was adopted which is constituted by a low-yield metal ring, but also this solution does not offer a high enough reliability, as required in the concerned field.

The purpose of the present invention is precisely of obviating the above said drawbacks and therefore supplying a joint which, besides making it possible pipes to be rapidly connected, also ensures that an effective and reliable tight-seal will be achieved also under extremely hostile operating conditions, i.e., under conditions of high differential pressures, and high temperatures.

The above purpose is substantially achieved by accomplishing, between the male hollow body and the female hollow body of the joint, a double

metal interference seal activated by one single sleeve. In that way, in fact, whilst the metal interference seal, besides not requiring any additional elements such as gaskets, with it consequently being simpler from a constructional viewpoint -- thanks to said seal being realized by the same metal male and female bodies which constitute the joint -- additionally ensures the seal tightness to be achieved also in presence of extremely high internal pressures, with the double seal anyway securing the seal tightness also in presence of high external pressure.

Summing up, the joint for rapid, tight-seal connection of pipes, comprising a female hollow body to be butt-fastened onto a pipe, a male hollow body to be butt-fastened to a second pipe and cooperating with said female body, as well as a sleeve suitable for being externally screwed down onto said female body, is characterized according to the present invention in that said male hollow body is provided with an externally overhanging shoulder integral with said body, which shoulder cooperates, on one of its sides, with said sleeve and, on its other side, with the end of said female hollow body, from which an internal, decreasing-cross section flaring extends, which is suitable for coming into engagement, with interference, with a corresponding external counterflaring provided on said male hollow body in the nearby of said overhanging shoulder, from the end of said male hollow body a second decreasing-cross section flaring extending which is suitable for coming into engagement, with interference, with a corresponding counter-flaring provided inside the interior of said female body, in the nearby of an internal shoulder for said male body.

In that way, in fact, both said flarings/counter-flarings respectively provided on said metal male and female bodies of the joint realize said two metal interference seals, and namely, a primary seal at the end of the male body, which substantially realizes the internal seal; and a secondary seal at the end of the female body, which substantially realizes the external seal; which seals are activated by said sleeve being screwed down until it comes to rest against said overhanging shoulder, which also performs the task of rendering mutually mechanically integral both said metal bodies of said joint.

Then, according to a preferred embodiment of the present invention, both said flarings and corresponding counter-flarings have a cone frustum shape.

Still according to a further preferred embodiment of the present invention, said flarings have a spherical-surface bulging and are designed to come into interference engagement with respective counter-flarings of cone frustum shape.

Finally, according to a still further preferred embodiment of the present invention, the terminal end of said male hollow body of the joint, comprised between said overhanging external shoulder and its end, is tapered towards said end thereof, correspondingly to the terminal portion of the female body of said joint.

In that way, sliding and trueing the male body into the female body is made easier.

The invention is explained now in greater detail by referring to the accompanying drawing which illustrates preferred embodiments supplied for merely exemplifying, non limitative, purposes, because technical or constructional variants may be always supplied without departing from the scope of the present invention.

In said drawing:

Figure 1 displays a longitudinal sectional view of a joint for rapid, tight seal connection of pipes, accomplished to the present invention;

Figure 2 shows a longitudinal section view, on a strongly enlarged scale, of a detail of the joint of Figure 1;

Figure 3 displays a longitudinal sectional view, on a strongly enlarged scale, of another detail of the joint of Figure 1.

Referring to the Figures, with 1 the male hollow body of the joint is indicated, the terminal portion 1' of which is provided with a screw thread 2, which makes it possible said male body to be fastened onto one of said two pipes or elements to be connected with each other and not displayed in figure, whereas its terminal portion 1'', comprised between its end 1''' and an outwards overhanging shoulder 3 integral with said body 1, is tapered towards said end 1''' thereof in order to facilitate its sliding and trueing into the terminal portion 4'' of the female body 4 of the same joint, which portion 4'' of said female hollow body is tapered with a complementary pattern; the terminal portion 4' of said female body 4 is then additionally provided with a screw thread 5 which makes it possible said female body to be fastened onto the other of said pipes or tubing elements to be connected, whilst said terminal portion 4'' is provided with an internal shoulder 6 for said end 1''' of said male body 1, and with an external screw thread 7 which makes it possible a sleeve 8 sliding along said male body 1 to be screwed down onto said female body, until said sleeve comes to rest against said overhanging shoulder 3; and, furthermore, ends with an end 4''' which comes to rest against the lower side of said overhanging shoulder 3.

From said end 4''' of the female body 4, an internal flaring 9 with decreasing cross-section extends hence (specific references is made here to Figure 2), which is suitable for getting into interference engagement, under tight-seal conditions, with

a corresponding external counter-flaring 10 provided on said male body 1. Correspondingly, from said end 1''' of said male body 1, a bulged flaring with spherical surface 11 extends externally, which is suitable for getting into interference engagement with a respective cone-frustum counter-flaring 12 provided on said female body 4.

The operating way of such a kind of joint is now evident.

After the male hollow body 1 being slid into the female hollow body 4, when the sleeve 8 is screwed down onto the female body 4, by means of the screw-thread 7, a relative motion between both said bodies 1 and 4 is generated which, by overcoming the resistance caused by the interference engagements between the flarings 9 and 11 and their respective counter-flarings 10 and 12, realizes the metal interference seals between said flarings and counter-flarings, which metal interference seals ensure the seal tightness against both internal and external pressures, whichever they may be.

Claims

1. Joint for rapid, tight-seal connection of pipes, comprising a female hollow body to be butt-fastened onto a pipe, a male hollow body to be butt-fastened to a second pipe and cooperating with said female body, as well as a sleeve suitable for being externally screwed down onto said female body, is characterized in that said male hollow body is provided with an externally overhanging shoulder integral with said body, which shoulder cooperates, on one of its sides, with said sleeve and, on its other side, with the end of said female hollow body, from which an internal, decreasing-cross section flaring extends, which is suitable for coming into engagement, with interference, with a corresponding external counter-flaring provided on said male hollow body in the nearby of said overhanging shoulder, from the end of said male hollow body a second decreasing-cross section flaring extending which is suitable for coming into engagement, with interference, with a corresponding counter-flaring provided inside the interior of said female body, in the nearby of an internal shoulder for said male body.
2. Joint for rapid, tight-seal connection of pipes according to claim 1, characterized in that said flarings and corresponding counter-flarings have a cone frustum shape.
3. Joint for rapid, tight-seal connection of pipes according to claim 1, characterized in that said

flarings have a spherical-surface bulging and get into interference engagement with respective counter-flarings of cone frustum shape.

4. Joint for rapid, tight-seal connection of pipes according to claim 1, characterized in that the terminal end of said male hollow body of the joint, comprised between said overhanging external shoulder and its end, is tapered towards said end thereof, correspondingly to the terminal portion of the female body of said joint.

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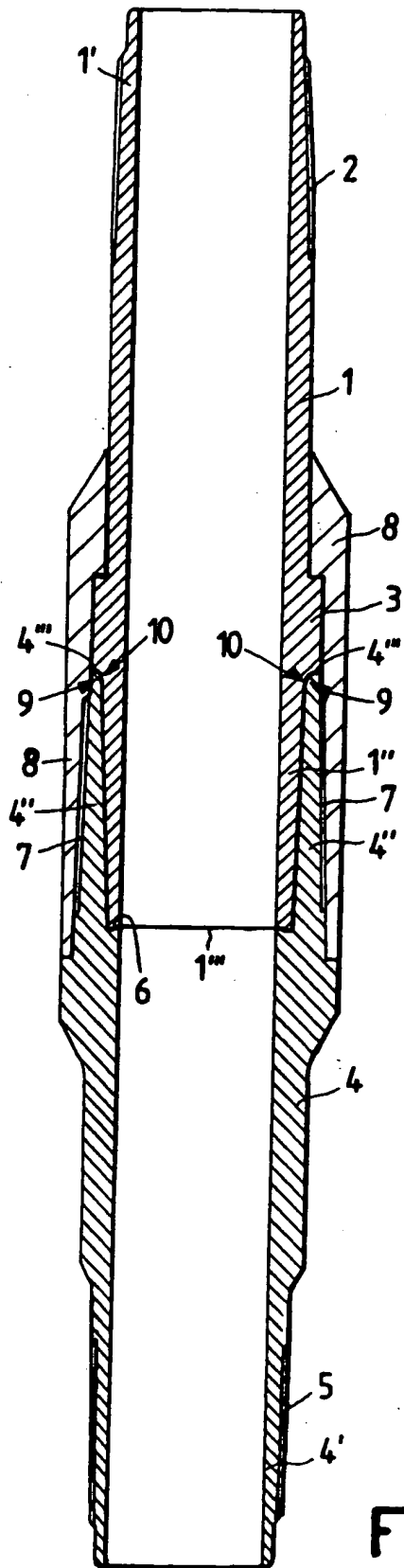


Fig.1

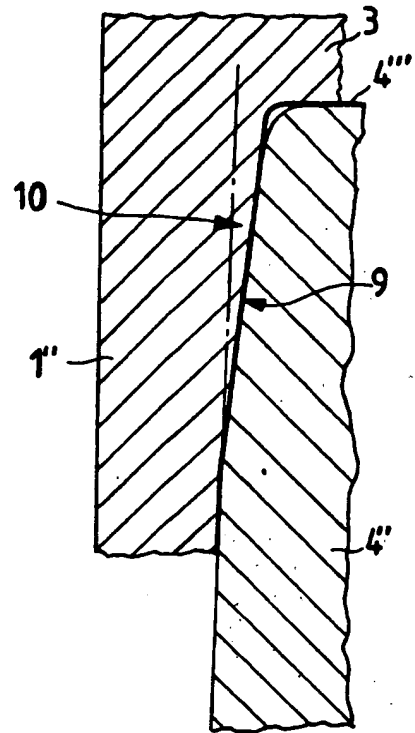


Fig. 2

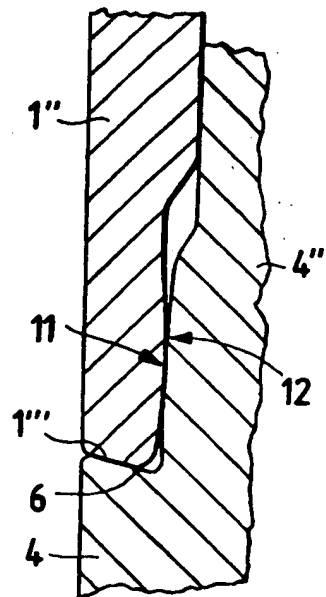


Fig. 3